

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
2 October 2003 (02.10.2003)

PCT

(10) International Publication Number
WO 03/080784 A1(51) International Patent Classification⁷: C11D 1/94,
3/00, 3/20

(21) International Application Number: PCT/US03/08617

(22) International Filing Date: 19 March 2003 (19.03.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/103,302 21 March 2002 (21.03.2002) US
10/350,717 27 January 2003 (27.01.2003) US(71) Applicant: COLGATE-PALMOLIVE COMPANY
[US/US]; 300 Park Avenue, New York, NY 10022 (US).(72) Inventors: ARVANITIDOU, Evangelia; 40 Curtis Court,
Kendall Park, NJ 08824 (US). SURIANO, David; 7 Cherry
Blossom Drive, Monroe Township, NJ 08831 (US).(74) Agent: NANFELDT, Richard, E.; Colgate-Palmolive-
Company, 909 River Road, P.O. Box 1343, Piscataway, NJ
08855-1343 (US).(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD,
SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ,
VC, VN, YU, ZA, ZM, ZW.(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FOAMSTABLE ANTIMICROBIAL LIQUID DISH CLEANING COMPOSITIONS

(57) Abstract: An antibacterial liquid dish cleaning composition with desirable cleansing properties comprising a C78-18#191 ethoxylated alkyl ether sulfate, two anionic surfactant, a betaine surfactant, a hydroxy containing organic acid, an alkyl polyglucoside surfactant, a preservative, at least one solubilizer and water.

WO 03/080784 A1

BEST AVAILABLE COPY

FOAMSTABLE ANTIMICROBIAL LIQUID DISH CLEANING COMPOSITIONS

5

Field of Invention

This invention relates to a mild antibacterial liquid dish cleaning composition of
10 high active surfactant level containing APG and higher betaine levels, having improved
stability which is designed to disinfect the surface being treated while maintaining good
foaming grease cutting, rinsing and mildness properties.

Background of the Invention

The present invention relates to novel light duty liquid detergent compositions
15 containing APG and higher betaine levels with an improved stability profile and high
foaming and good grease cutting properties as well as disinfecting properties.

The prior art is replete with light duty liquid detergent compositions containing
nonionic surfactants in combination with anionic and/or betaine surfactants wherein the
nonionic detergent is not the major active surfactant. In U.S. Patent No. 3,658,985 an
20 anionic based shampoo contains a minor amount of a fatty acid alkanolamide. U.S.
Patent No. 3,769,398 discloses a betaine-based shampoo containing minor amounts of
nonionic surfactants. This patent states that the low foaming properties of nonionic
detergents renders its use in shampoo compositions non-preferred. U.S. Patent No.
4,329,335 also discloses a shampoo containing a betaine surfactant as the major
25 ingredient and minor amounts of a nonionic surfactant and of a fatty acid mono- or di-
ethanolamide. U.S. Patent No. 4,259,204 discloses a shampoo comprising 0.8 to 20%
by weight of an anionic phosphoric acid ester and one additional surfactant which may
be either anionic, amphoteric, or nonionic. U.S. Patent No. 4,329,334 discloses an

anionic-amphoteric based shampoo containing a major amount of anionic surfactant and lesser amounts of a betaine and nonionic surfactants.

U.S. Patent No. 3,935,129 discloses a liquid cleaning composition containing an alkali metal silicate, urea, glycerin, triethanolamine, an anionic detergent and a nonionic
5 detergent. The silicate content determines the amount of anionic and/or nonionic detergent in the liquid cleaning composition. However, the foaming properties of these detergent compositions are not discussed therein.

U.S. Patent No. 4,129,515 discloses a heavy duty liquid detergent for laundering fabrics comprising a mixture of substantially equal amounts of anionic and nonionic
10 surfactants, alkanolamines and magnesium salts, and, optionally, zwitterionic surfactants as suds modifiers.

U.S. Patent No. 4,224,195 discloses an aqueous detergent composition for laundering socks or stockings comprising a specific group of nonionic detergents, namely, an ethylene oxide of a secondary alcohol, a specific group of anionic
15 detergents, namely, a sulfuric ester salt of an ethylene oxide adduct of a secondary alcohol, and an amphoteric surfactant which may be a betaine, wherein either the anionic or nonionic surfactant may be the major ingredient.

The prior art also discloses detergent compositions containing all nonionic surfactants as shown in U.S. Patent Nos. 4,154,706 and 4,329,336 wherein the
20 shampoo compositions contain a plurality of particular nonionic surfactants in order to affect desirable foaming and deterative properties despite the fact that nonionic surfactants are usually deficient in such properties.

U.S. Patent No. 4,013,787 discloses a piperazine based polymer in conditioning and shampoo compositions which may contain all nonionic surfactant or all anionic
25 surfactant.

U.S. Patent No. 4,450,091 discloses high viscosity shampoo compositions containing a blend of an amphoteric betaine surfactant, a polyoxybutylenepolyoxyethylene nonionic detergent, an anionic surfactant, a fatty acid alkanolamide and a polyoxyalkylene glycol fatty ester. But, none of the exemplified

compositions contain an active ingredient mixture wherein the nonionic detergent is present in major proportion which is probably due to the low foaming properties of the polyoxybutylene polyoxyethylene nonionic detergent.

U.S. Patent No. 4,595,526 describes a composition comprising a nonionic
5 surfactant, a betaine surfactant, an anionic surfactant and a C₁₂-C₁₄ fatty acid monoethanolamide foam stabilizer.

U.S. Patent 6,147,039 teaches an antibacterial hand cleaning composition having a low surfactant content.

Summary of the Invention

10 It has now been found that a mild, antibacterial liquid dish cleaning composition containing APG and higher betaine levels having improved stability can be formulated with three different anionic surfactants, a zwitterionic surfactant, an alkyl glucoside surfactant, a hydroxy aliphatic acid, a solubilizer, a preservative, and water which has desirable cleaning and foaming properties.

15 An object of this invention is to provide an antibacterial liquid dish cleaning composition which comprises a sulfate surfactant, two sulfonate anionic surfactants, a zwitterionic surfactant, an alkyl polyglucoside surfactant, a solubilizer, a hydroxy aliphatic acid, a preservative and water, wherein the composition does not contain any
20 silicas, abrasives, acyl isoethionate, 2-hydroxy-4,2',4'-trichloridiphenyl ether, phosphoric acid, phosphonic acid, boric acid, alkali metal carbonates, alkaline earth metal carbonates, alkyl glycine surfactant, cyclic imidinium surfactant, or more than 3 wt. % of a fatty acid or salt thereof.

Another object of this invention is to provide a mild antibacterial liquid dish
25 cleaning composition having improved stability and with desirable high foaming and cleaning properties which kills bacteria.

Additional objects, advantages and novel features of the invention will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art upon examination of the following or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained

by means of the instrumentalities and combinations particularly pointed out in the appended claims.

Detailed Description of the Invention

This invention relates to an antibacterial liquid dish cleaning composition which comprises approximately by weight:

(a) 1% to 9% of a sodium salt of a C₈-C₁₆ linear alkyl benzene sulfonate surfactant;

(b) 4% to 16% of a magnesium salt of a C₈-C₁₆ linear alkyl benzene sulfonate surfactant;

(c) 4% to 16% of an ammonium or sodium salt of an ethoxylated C₈-C₁₈ alkyl ether sulfate surfactant;

(d) 0.1% to 5% of a zwitterionic surfactant;

(e) 0.5% to 5%, more preferably 0.5% to 4% of a hydroxy containing organic acid;

(f) 5% to 15% of an alkyl polyglucoside surfactant;

(g) 0.1% to 10%, more preferably 0.5% to 10% of at least one solubilizer;

(h) 0.005% to 3.0% of a preservative; and

(i) the balance being color, fragrance, UV absorber and water, wherein the composition has a pH of 3 to 4.5 and has a viscosity of 200 to 800 cps, more preferably 200 to 600 cps at 25°C using a #21 spindle at 20 rpm as measured on a Brookfield RVTDV-II viscometer, wherein the composition does not contain any grease release agents such as choline chloride or buffering system which is a nitrogenous buffer which is ammonium or alkaline earth carbonate, amine oxide surfactants, guanidine derivatives, alkoxyalkyl amines and alkyleneamines C₃-C₇ alkyl and alkenyl monobasic and dibasic acids such as C₄-C₇ aliphatic carboxylic diacids which do not contain a hydroxy group, boric acid, phosphoric acid, ethoxylated nonionic surfactants and amino alkylene phosphonic acid.

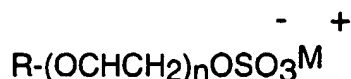
The anionic sulfonate surfactants which may be used in the detergent of this invention are selected from the consisting of water soluble and include the sodium,

potassium, ammonium, magnesium and ethanolammonium salts of linear C₈-C₁₆ alkyl benzene sulfonates; C₁₀-C₂₀ paraffin sulfonates, alpha olefin sulfonates containing about 10-24 carbon atoms and C₈-C₁₈ alkyl sulfates and mixtures thereof.

The paraffin sulfonates may be monosulfonates or di-sulfonates and usually are mixtures thereof, obtained by sulfonating paraffins of 10 to 20 carbon atoms. Preferred paraffin sulfonates are those of C₁₂-18 carbon atoms chains, and more preferably they are of C₁₄-17 chains. Paraffin sulfonates that have the sulfonate group(s) distributed along the paraffin chain are described in U.S. Patents 2,503,280; 2,507,088; 3,260,744; and 3,372,188; and also in German Patent 735,096. Such compounds may be made to specifications and desirably the content of paraffin sulfonates outside the C₁₄-17 range will be minor and will be minimized, as will be any contents of di- or poly-sulfonates.

Examples of suitable other sulfonated anionic detergents are the well known higher alkyl mononuclear aromatic sulfonates, such as the higher alkylbenzene sulfonates containing 9 to 18 or preferably 9 to 16 carbon atoms in the higher alkyl group in a straight or branched chain, or C₈-15 alkyl toluene sulfonates. A preferred alkylbenzene sulfonate is a linear alkylbenzene sulfonate having a higher content of 3-phenyl (or higher) isomers and a correspondingly lower content (well below 50%) of 2-phenyl (or lower) isomers, such as those sulfonates wherein the benzene ring is attached mostly at the 3 or higher (for example 4, 5, 6 or 7) position of the alkyl group and the content of the isomers in which the benzene ring is attached in the 2 or 1 position is correspondingly low. Preferred materials are set forth in U.S. Patent 3,320,174, especially those in which the alkyls are of 10 to 13 carbon atoms.

The C₈-18 ethoxylated alkyl ether sulfate surfactants have the structure



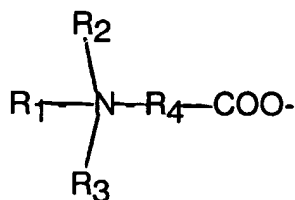
wherein n is about 1 to about 22 more preferably 1 to 3 and R is an alkyl group having about 8 to about 18 carbon atoms, more preferably 12 to 15 and natural cuts, for

example, C₁₂₋₁₄ or C₁₂₋₁₆ and M is an ammonium cation or a metal cation, most preferably sodium.

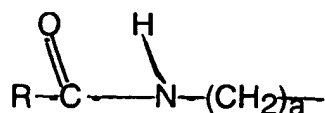
The ethoxylated alkyl ether sulfate may be made by sulfating the condensation product of ethylene oxide and C₈₋₁₀ alkanol, and neutralizing the resultant product.

- 5 The ethoxylated alkyl ether sulfates differ from one another in the number of carbon atoms in the alcohols and in the number of moles of ethylene oxide reacted with one mole of such alcohol. Preferred ethoxylated alkyl ether polyethenoxy sulfates contain 12 to 15 carbon atoms in the alcohols and in the alkyl groups thereof, e.g., sodium myristyl (3 EO) sulfate.
- 10 Ethoxylated C₈₋₁₈ alkylphenyl ether sulfates containing from 2 to 6 moles of ethylene oxide in the molecule are also suitable for use in the invention compositions. These detergents can be prepared by reacting an alkyl phenol with 2 to 6 moles of ethylene oxide and sulfating and neutralizing the resultant ethoxylated alkylphenol. The concentration of the ethoxylated alkyl ether sulfate surfactant is about 1 to about 8
- 15 wt. %.

The water-soluble zwitterionic surfactant, which is an essential ingredient of present liquid detergent composition, provides good foaming properties and mildness to the present nonionic based liquid detergent. The zwitterionic surfactant is a water soluble betaine having the general formula:



wherein R₁ is an alkyl group having 10 to 20 carbon atoms, preferably 12 to 16 carbon atoms, or the amido radical:



wherein R is an alkyl group having 9 to 19 carbon atoms and a is the integer 1 to 4; R₂ and R₃ are each alkyl groups having 1 to 3 carbons and preferably 1 carbon; R₄ is an

alkylene or hydroxyalkylene group having from 1 to 4 carbon atoms and, optionally, one hydroxyl group. Typical alkyldimethyl betaines include decyl dimethyl betaine or 2-(N-decyl-N, N-dimethyl-ammonia) acetate, coco dimethyl betaine or 2-(N-coco N, N-dimethylammonio) acetate, myristyl dimethyl betaine, palmityl dimethyl betaine, lauryl diemethyl betaine, cetyl dimethyl betaine, stearyl dimethyl betaine, etc. The amidobetaines similarly include cocoamidoethylbetaine, cocoamidopropyl betaine and the like. A preferred betaine is coco (C₈-C₁₈) amidopropyl dimethyl betaine.

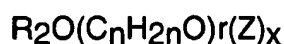
The alkyl polysaccharides surfactants, which are used in conjunction with the aforementioned surfactants have a hydrophobic group containing from about 8 to about 20 carbon atoms, preferably from about 10 to about 16 carbon atoms, most preferably from about 12 to about 14 carbon atoms, and polysaccharide hydrophilic group containing from about 1.5 to about 10, preferably from about 1.5 to about 4, most preferably from about 1.6 to about 2.7 saccharide units (e.g., galactoside, glucoside, fructoside, glucosyl, fructosyl; and/or galactosyl units). Mixtures of saccharide moieties may be used in the alkyl polysaccharide surfactants. The number x indicates the number of saccharide units in a particular alkyl polysaccharide surfactant. For a particular alkyl polysaccharide molecule x can only assume integral values. In any physical sample of alkyl polysaccharide surfactants there will be in general molecules having different x values. The physical sample can be characterized by the average value of x and this average value can assume non-integral values. In this specification the values of x are to be understood to be average values. The hydrophobic group (R) can be attached at the 2-, 3-, or 4- positions rather than at the 1-position, (thus giving e.g. a glucosyl or galactosyl as opposed to a glucoside or galactoside). However, attachment through the 1- position, i.e., glucosides, galactoside, fructosides, etc., is preferred. In the preferred product the additional saccharide units are predominately attached to the previous saccharide unit's 2-position. Attachment through the 3-, 4-, and 6- positions can also occur. Optionally and less desirably there can be a polyalkoxide chain joining the hydrophobic moiety (R) and the polysaccharide chain. The preferred alkoxide moiety is ethoxide.

Typical hydrophobic groups include alkyl groups, either saturated or unsaturated, branched or unbranched containing from about 8 to about 20, preferably from about 10 to about 18 carbon atoms. Preferably, the alkyl group is a straight chain saturated alkyl group. The alkyl group can contain up to 3 hydroxy groups and/or the polyalkoxide chain can contain up to about 30, preferably less than about 10, alkoxide moieties.

Suitable alkyl polysaccharides are decyl, dodecyl, tetradecyl, pentadecyl, hexadecyl, and octadecyl, di-, tri-, tetra-, penta-, and hexagluco-
sides, galactosides, lactosides, fructosides, fructosyls, lactosyls, glucosyls and/or galactosyls and mixtures thereof.

The alkyl monosaccharides are relatively less soluble in water than the higher alkyl polysaccharides. When used in admixture with alkyl polysaccharides, the alkyl monosaccharides are solubilized to some extent. The use of alkyl monosaccharides in admixture with alkyl polysaccharides is a preferred mode of carrying out the invention. Suitable mixtures include coconut alkyl, di-, tri-, tetra-, and pentagluco-
sides and tallow alkyl tetra-, penta-, and hexagluco-
sides.

The preferred alkyl polysaccharides are alkyl polyglucosides having the formula



wherein Z is derived from glucose, R is a hydrophobic group selected from the group consisting of alkyl, alkylphenyl, hydroxyalkylphenyl, and mixtures thereof in which said alkyl groups contain from about 10 to about 18, preferably from about 12 to about 14 carbon atoms; n is 2 or 3 preferably 2, r is from 0 to 10, preferable 0; and x is from 1.5 to 8, preferably from 1.5 to 4, most preferably from 1.6 to 2.7. To prepare these compounds a long chain alcohol (R_2OH) can be reacted with glucose, in the presence of an acid catalyst to form the desired glucoside. Alternatively the alkyl polyglucosides can be prepared by a two step procedure in which a short chain alcohol (R_1OH) can be reacted with glucose, in the presence of an acid catalyst to form the desired glucoside. Alternatively the alkyl polyglucosides can be prepared by a two step procedure in which a short chain alcohol (C_{1-6}) is reacted with glucose or a polyglucoside ($x=2$ to 4) to

yield a short chain alkyl glucoside ($x=1$ to 4) which can in turn be reacted with a longer chain alcohol (R_2OH) to displace the short chain alcohol and obtain the desired alkyl polyglucoside. If this two step procedure is used, the short chain alkylglucosde content of the final alkyl polyglucoside material should be less than 50%, preferably less than 10%, more preferably less than about 5%, most preferably 0% of the alkyl polyglucoside.

The amount of unreacted alcohol (the free fatty alcohol content) in the desired alkyl polysaccharide surfactant is preferably less than about 2%, more preferably less than about 0.5% by weight of the total of the alkyl polysaccharide. For some uses it is desirable to have the alkyl monosaccharide content less than about 10%.

The used herein, "alkyl polysaccharide surfactant" is intended to represent both the preferred glucose and galactose derived surfactants and the less preferred alkyl polysaccharide surfactants. Throughout this specification, "alkyl polyglucoside" is used to include alkyl polyglycosides because the stereochemistry of the saccharide moiety is changed during the preparation reaction.

An especially preferred APG glycoside surfactant is APG 625 glycoside manufactured by the Henkel Corporation of Ambler, PA. APG25 is a nonionic alkyl polyglycoside characterized by the formula:



wherein $n=10$ (2%); $n=122$ (65%); $n=14$ (21-28%); $n=16$ (4-8%) and $n=18$ (0.5%) and x (degree of polymerization) = 1.6. APG 625 has: a pH of 6 to 10 (10% of APG 625 in distilled water); a specific gravity at 25°C of 1.1 g/ml; a density at 25°C of 9.1 lbs/gallon; a calculated HLB of 12.1 and a Brookfield viscosity at 35°C, 21 spindle, 5-10 RPM of 3,000 to 7,000 cps.

The hydroxy containing organic acid is ortho hydroxy benzoic acid or preferably a hydroxy aliphatic acid selected from the group consisting of lactic acid, citric acid, salicylic acid and glycolic and mixtures thereof, wherein citric acid is preferred.

The instant light duty liquid nonmicroemulsion compositions can contain about 0 wt. % to about 10 wt. %, more preferably about 1 wt. % to about 8 wt. %, of at least one

solubilizing agent selected from the group consisting of a C₂-5 mono, dihydroxy or polyhydroxy alkanols such as ethanol, isopropanol, glycerol ethylene glycol, diethylene glycol, propylene glycol, and hexylene glycol and mixtures thereof and alkali metal cumene or xylene sulfonates such as sodium cumene sulfonate and sodium xylene sulfonate. The solubilizing agents are included in order to control low temperature cloud clear properties.

The instant formulas explicitly exclude alkali metal silicates and alkali metal builders such as alkali metal polyphosphates, alkali metal carbonates, alkali metal phosphonates and alkali metal citrates because these materials, if used in the instant composition, would cause the composition to have a high pH as well as leaving residue on the surface being cleaned.

The final essential ingredient in the inventive compositions having improved interfacial tension properties is water. The proportion of water in the compositions generally is in the range of 10% to 95%.

The liquid cleaning composition of this invention may, if desired, also contain other components either to provide additional effect or to make the product more attractive to the consumer. The following are mentioned by way of example: Colors or dyes in amounts up to 0.5% by weight; bactericides in amounts up to 1% by weight; UV absorbents, or antioxidizing agents, and pH adjusting agents, such as sulfuric acid or sodium hydroxide, as needed. Furthermore, if opaque compositions are desired, up to 4% by weight of an opacifier may be added.

Preservatives which can be used in the instant compositions at a concentration of 0.005 wt. % to 3 wt. %, more preferably 0.01 wt. % to 2.5 wt. % are: benzalkonium chloride; benzethonium chloride, 5-bromo-5-nitro-1,3-dioxane; 2-bromo-2-nitropropane-1,3-diol; alkyl trimethyl ammonium bromide; N-(hydroxymethyl)-N'-(1,3-dihydroxy methyl-2,5-dioxo-4-imidaxolidinyl)-N'-(hydroxy methyl) urea; 1-3-dimethylol-5,5-dimethyl hydantoin; formaldehyde; iodopropynyl butyl carbamate, butyl paraben; ethyl paraben; methyl paraben; propyl paraben, mixture of methyl isothiazolinone/methyl-chloroisothiazoline in a 1:3 wt. ratio; mixture of phenoxyethanol/butyl paraben/methyl

paraben/propylparaben; 2-phenoxyethanol; tris-hydroxyethyl-hexahydrotriazine; methylisothiazolinone; 5-chloro-2-methyl-4-isothiazolin-3-one; 1,2-dibromo-2, 4-dicyanobutane; 1-(3-chloroalkyl)-3,5,7-triaza-azoniaadamantane chloride; and sodium benzoate. PH adjusting agents such as sulfuric acid or sodium hydroxide can be used
5 as needed.

In final form, the instant compositions exhibit stability at reduced and increased temperatures. More specifically, such compositions remain clear and stable in the range of 0°C to 50°C, especially 5°C to 43°C. Such compositions exhibit a pH of 3 to 5.

10 The following examples illustrate the liquid body cleaning compositions of the described invention. Unless otherwise specified, all percentages are by weight. The exemplified compositions are illustrative only and do not limit the scope of the invention. Unless otherwise specified, the proportions in the examples and elsewhere in the specification are by weight.

15 The instant compositions have a minimum foam volume of 350mls after 40 rotations at room temperature as measured by the foam volume test using 0.0333 wt. % of the Ultra composition in 150 ppm of water. The Shake foam test is an inverted cylinder test in which 100 gr. of a 0.0333 wt. % LDL formula in 150 ppm of H₂O is placed in a stoppered graduate cylinder (500 ml) and inverted 40 cycles at a rate of 30
20 cycles/minute. After 40 inversions, the foam volume which has been generated is measured in mls inside the graduated cylinder. This value includes the 100 ml of LDL solution inside the cylinder. After the initial volume is measured, 175 microliters of whole milk is added to the solution. The cylinder is then inverted for another 40 cycles and a foam volume with soil is measured; the foam volume after the soil addition is at
25 least 130mls. The values provided above include the 100 ml's of LDL solution inside the cylinder.

The Modified Germicidal Spray Test was used to determine the surface disinfection profile. The Modified Germicidal Spray test protocol was designed by MicroBiotest Inc., Sterling Virginia, to determine percentage of germs killed on hard

surfaces such as dishware. The method determines the efficacy of products intended to be used for one-step cleaning and germ killing on surface of dishware and is based on the Germicidal Spray Products test, Official Methods of Analysis, Sixteenth edition, 1995, AOAC.

5

Example 1

The following composition is listed as a wt. %. The physical properties and appearance (i.e. viscosity, cloud point, color) are unchanged upon aging in extreme temperature conditions.

10

	A
Magnesium linear alkyl benzene sulfonate	9
Sodium linear alkyl benzene sulfonate	3
Ammonium alkyl ether sulfate 1.3EO	11.5
Alkyl polyglucoside	9.5
Citric acid	1
Cocoamidopropyl betaine	5
Fragrance	1
Ethanol	1.3
Sodium xylene sulfonate	3.5
Orange color solution	0.14
Glucoserve LAD preservative	0.11
Perfume	0.45
Benzotriazolyl Dodecyle P- Cresol, Dodecene Homopolymer (Tinogard TL)- UV absorber	0.03
Deionized water	Balance
pH	3.5
Viscosity, initial	410
Viscosity, after 2 weeks @135F	410
Color, initial	Orange
Color, after 2 weeks @135F	Orange/ no loss of color & no precipitation

Example 2

The following composition is listed as a wt. %. The dishwashing performance as shown below foam measurements, has been unchanged upon aging at extreme temperature conditions.

	A
Magnesium linear alkyl benzene sulfonate	9
Sodium linear alkyl benzene sulfonate	3
Ammonium alkyl ether sulfate 1.3EO	11.5
Alkyl polyglucoside	9.5
Citric acid	1
Cocoamidopropyl betaine	5
Fragrance	1
Ethanol	1.3
Sodium xylene sulfonate	3.5
Orange color solution	0.14
Glucoserve LAD preservative	0.11
Perfume	0.45
Benzotriazolyl Dodecyle P- Cresol, Dodecene Homopolymer (Tinogard TL)- UV absorber	0.03
Deionized water	Balance
pH	3.5
Initial Performance: Shake foam, I (ml)	377
Initial Performance: Shake foam, F (ml)	143
Performance after 2 weeks @ 135F: Shake foam, I(ml)	365
Performance after 2 weeks @ 135F: Shake foam, F(ml)	140
Modified GST (1% dilution, 1 minute contact time/ staph aureus and e-coli or salmonella)/ Log reduction	>=2log

What Is Claimed:

1. A mild antibacterial liquid dish cleaning composition which comprises approximately by weight:

(a) 1% to 9% of a sodium salt of a C₈-C₁₆ linear alkyl benzene sulfonate
5 surfactant;

(b) 4% to 16% of a magnesium salt of a C₈-C₁₆ linear alkyl benzene sulfonate surfactant;

(c) 4% to 16% of an ammonium or sodium salt of an ethoxylated C₈-C₁₈ alkyl ether sulfate surfactant;

10 (d) 0.1% to 5% of a zwitterionic surfactant;

(e) 0.5% to 5% of a hydroxy containing organic acid;

(f) 5% to 15% of an alkyl polyglucoside surfactant;

(g) 0.1% to 10% of at least one solubilizer;

(h) 0.005% to 3.0% of a preservative; and

15 (i) the balance being color, perfume, UV absorber and water, wherein the composition has a pH of 3 to 4 and has a viscosity of 100 to 1,000 cps at 25°C using a #21 spindle at 20 rpm as measured on a Brookfield RVTDV-II viscometer, wherein the composition does not contain any choline chloride ammonium or alkaline earth carbonate, amine oxide surfactants, guanidine derivatives, alkoxyalkyl amines and
20 alkyleneamines C₃-C₇ alkyl and alkenyl monobasic and dibasic acids such as C₄-C₇ aliphatic carboxylic diacids which do not contain a hydroxy group, boric acid, phosphoric acid, ethoxylated nonionic surfactants, and amino alkylene phosphonic acid and the composition is pourable and not a gel has a complex viscosity at 1 rad s⁻¹ of less than 0.4 Pascal seconds.

PCT/US 03/08617

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C11D1/94 C11D3/00 C11D3/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 05745 A (COLGATE PALMOLIVE CO) 12 February 1998 (1998-02-12) page 14 -page 15; claims 10-13; example 1 page 1, line 4-7 ---	1
A	US 6 172 022 B1 (ARVANITIDOU EVANGELIA) 9 January 2001 (2001-01-09) column 1, line 7-9; examples A-F column 2, line 20-22 ---	1
A	EP 0 509 608 A (COLGATE PALMOLIVE CO) 21 October 1992 (1992-10-21) page 1, line 6-8; claims 1,6-8 --- -/--	1

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- * & * document member of the same patent family

Date of the actual completion of the international search

23 July 2003

Date of mailing of the international search report

31/07/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Klier, E

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 851 974 A (SANDHU SUKHVINDER) 22 December 1998 (1998-12-22) column 1, line 4-9; claims 1-3; examples A-F column 2, line 28-33 -----	1

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9805745	A	12-02-1998	AU 3825697 A	25-02-1998
			WO 9805745 A2	12-02-1998
			US 5932534 A	03-08-1999
			US 5856293 A	05-01-1999
US 6172022	B1	09-01-2001	AU 5533501 A	30-10-2001
			EP 1274823 A2	15-01-2003
			WO 0179404 A2	25-10-2001
EP 0509608	A	21-10-1992	US 5565146 A	15-10-1996
			AT 140259 T	15-07-1996
			AU 661682 B2	03-08-1995
			AU 1475392 A	22-10-1992
			CA 2066009 A1	16-10-1992
			CN 1067068 A	16-12-1992
			DE 69212045 D1	14-08-1996
			DE 69212045 T2	27-02-1997
			EP 0509608 A2	21-10-1992
			FI 921673 A	16-10-1992
			GR 1001299 B	30-07-1993
			HU 60761 A2	28-10-1992
			IE 921184 A1	21-10-1992
			JP 5132699 A	28-05-1993
			MW 2192 A1	12-01-1994
			MX 9201702 A1	01-10-1992
			NO 921480 A	16-10-1992
			PL 294238 A1	25-01-1993
			PT 100381 A , B	30-06-1993
			RO 108359 B1	28-04-1994
			RU 2073700 C1	20-02-1997
			TR 25951 A	01-11-1993
			US 5480586 A	02-01-1996
			ZA 9202608 A	11-10-1993
			ZM 1892 A1	25-04-1994
			NZ 242284 A	25-02-1994
US 5851974	A	22-12-1998	NONE	

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☒ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.